Listing of Claims

1. (Currently Amended) An apparatus for measuring cellular electrical conditions comprising a cell support membrane component for supporting one or more cells which comprises: i) a first layer comprising a non-conductive material further comprising a top surface and bottom surface comprising one or more pores each extending between, and through, said top and bottom surfaces, wherein the top surface of the material comprises one or more cell attachment sites which circumscribe each of the pores of the material and are capable of contacting the cells ~~contact the cells~~, the pores being spaced apart such that only one pore may contact an individual cell, and wherein the pores of the material are capable of forming electrically tight seals with the contacted cells at the cell attachment sites, and ii) a second layer comprising a non-conductive, sealant material which directly contacts the first layer of the cell support membrane and spans across at least one pore.

2. (Original) The apparatus according to claim 1, wherein the cellular electrical conditions are selected from the group consisting of transmembrane potential, capacitance, resistance, and conductance.

3. (Previously Presented) The apparatus according to claim 1, wherein the first layer of the cell support membrane component comprises material selected from the group consisting of glass, plastic, rubber, polytetrafluoroethylene, polytetrafluoroethylene/glass, polyethylene terephthlate, and polycarbonate.

4. (Previously Presented) The apparatus according to claim 1, wherein the second layer of the cell support membrane component comprises material selected from the group consisting of polytetrafluoroethylene, polytetrafluoroethylene/glass,

polyethylene terephthlate, and polycarbonate.

5. (Previously Presented) The apparatus according to claim 1, wherein the second layer of the cell support membrane component comprises material selected from the group consisting of polyhydroxybutyrate, polylactate, polyglycolic acid, polycaprolactone, cellulose, starch, and collagen.

6. (Previously Presented) The apparatus according to claim 1, wherein the second layer of the cell support membrane component comprises a dye.

7. (Previously Presented) The apparatus according to claim 6, wherein the second layer of the cell support membrane component comprises a Solvent Blue 14 dye.

8. (Previously Presented) The apparatus according to claim 1, wherein the cell attachment sites of the first layer of the cell support membrane component are treated with a composition comprising molecules that facilitate cell attachment.

9. (Original) The apparatus according to claim 8, wherein the molecules are selected from the group consisting of gelatin, poly-L-lysine, poly-D-lysine, collagen, and fibronectin.

10. (Previously Presented) The apparatus according to claim 1, wherein an area of the first layer of the cell support membrane component outside of the cell attachment sites is treated with a composition comprising molecules that inhibit cell attachment.

11. (Previously Presented) The apparatus according to claim 10, wherein the molecules are selected from the group consisting of silane, silicone, and polytetrafluoroethylene.

12. (Previously Presented) The apparatus according to claim 1, wherein the first

layer of the cell support membrane component displays at least 4 pores.

13. (Previously Presented) The apparatus according to claim 1, wherein the first layer of the cell support membrane component displays 1 pore.

14. (Previously Presented) The apparatus according to claim 1, wherein the pores of the first layer of the cell support membrane component are between 0.2 μm and 2 μm in diameter.

15. (Original) The apparatus according to claim 1, wherein the cells are selected from the group consisting of HEK-293 cells, Chinese hamster ovary cells, primary neuronal cells, skeletal muscle cells, smooth muscle cells, cardiac muscle cells, immune cells, epithelial cells, and endothelial cells.

16. (Original) The apparatus according to claim 15, wherein the primary neuronal cells are selected from the group consisting of hippocampus, dorsal root ganglia, and superior cervical ganglia cells.

17. (Original) The apparatus according to claim 1, wherein the cells comprise DNA constructs directing the expression of molecules selected from the group consisting of ion channel proteins, ion transporters, G-proteins, G-protein ligands, G-protein modulators, G-protein receptors, protein kinases, and protein phosphatases.

18. (Original) The apparatus according to claim 1, wherein the cells express ion channels that are specific for ions selected from the group consisting of sodium, potassium, calcium, and chloride.

19. (Original) The apparatus according to claim 1, wherein the cells are permeabilized by contact with any one of the following: i) an antibiotic selected from the group consisting of amphotericin and nystatin; ii) a detergent selected from the

group consisting of digitonin and saponin; or iii) a high voltage field.

20. (Previously Presented) The apparatus according to claim 1, wherein the second layer is positioned under the first layer of the cell support membrane component, and an area of the second layer of the cell support membrane component that spans a pore is selectively removable.

21. (Previously Presented) The apparatus according to claim 20, wherein the area of the second layer of the cell support membrane component is removable by microscope-assisted photo-ablation.

22. (Original) The apparatus according to claim 21, wherein the microscope is a confocal microscope.

23. (Original) The apparatus according to claim 21, wherein the photo-ablation is carried out with a flash lamp.

24. (Original) The apparatus according to claim 21, wherein the photo-ablation is carried out with a laser.

25. (Original) The apparatus according to claim 24, wherein the laser is selected from the group consisting of argon, helium/neon, krypton, YAG, and titanium-sapphire laser.

26. (Previously Presented) The apparatus according to claim 1, wherein the second layer is positioned over the first layer of the cell support membrane component, and an area of the second layer of the cell support membrane component that spans a pore is selectively removable.

27. (Previously Presented) The apparatus according to claim 26, wherein the area of the second layer of the cell support membrane component is removable by an

enzyme selected from the group consisting of proteases, cellulases, esterases, and depolymerases, the enzyme being secreted by the contacted cell.

28. (Previously Presented) The apparatus according to claim 1, further comprising a chamber to hold the cell support membrane component which includes a top area and bottom area, wherein the cell attachment sites of the cell support membrane component face the top area of the chamber.

29. (Previously Presented) The apparatus according to claim 28, further comprising electrolyte solution which contacts the first and second layers of the cell support membrane component.

30. (Previously Presented) The apparatus according to claim 29, further comprising two electrodes, electrode 1 and electrode 2, that are placed in the electrolyte solution, wherein said electrode 1 is a `ground` electrode and said electrode 2 is a current-passing/voltage-measuring electrode, and wherein one of the two electrodes faces the top surface of the first layer of the cell support membrane component, and one of the two electrodes faces the bottom surface of the first layer of the cell support membrane component.

31. (Original) The apparatus according to claim 30, further comprising local pre-amplification circuitry, and a voltage-clamp, current-clamp and lock-in amplifier.

32-120 (Canceled)

121. (Previously Presented) The apparatus according to claim 20, wherein the area of the second layer of the cell support membrane component is removed by digestion with an enzyme that is secreted by the cell.